

What is claimed is:

1 1. A system, comprising:

2 plural storage subsystems, each storage subsystem having a controller, an
3 expander, and zero or more storage devices coupled to the expander, the controller to access
4 storage devices through the expander, and the expander having interfaces for coupling to
5 storage devices; and

6 an intercontroller link to connect expanders in different storage subsystems to
7 enable the controller in one of the storage subsystems to communicate with the controller in
8 another one of the storage subsystems through the expanders and the intercontroller link.

1 2. The system of claim 1, wherein the controller, expander, and zero or more

2 storage devices in each storage subsystem are coupled by a serial interconnect.

1 3. The system of claim 1, wherein each of the storage subsystems have expanders

2 at plural levels, the intercontroller link connecting expanders in the two storage subsystems at
3 a first level, the system further comprising another intercontroller link to connect expanders
4 in the two storage subsystems at a second level.

1 4. The system of claim 1, wherein each storage subsystem includes serial

2 attached small computer system interface (SAS) phys.

1 5. The system of claim 4, wherein at least one of the expanders includes a SAS

2 phy connected to the intercontroller link, wherein the at least one of the expanders includes a
3 route table for the SAS phy, the route table containing a plurality of entries for routing
4 information in the storage subsystem.

1 6. The system of claim 5, wherein each of the expanders includes a route table

2 for the SAS phy connected to the intercontroller link, and the route table is programmed
3 differently than route tables for SAS phys not connected to the intercontroller link.

1 7. The system of claim 4, wherein each of the expanders includes one or more

2 SAS phys connected to the intercontroller link and one or more SAS phys connected to other

3 components of the storage subsystem, the system further comprising software to access the
4 storage subsystem,

5 wherein the one or more SAS phys connected to other components of the
6 storage subsystem are visible to normal SAS discovery software but the one or more SAS
7 phys connected to the intercontroller link are not visible to the SAS discovery software.

1 8. The system of claim 1, further comprising:
2 plural computers comprising respective plural storage subsystems.

1 9. The system of claim 1, wherein each of the two storage subsystems has
2 expanders at plural levels, the intercontroller link coupling expanders in the two storage
3 subsystems.

1 10. The system of claim 1, wherein each of the two storage subsystems has
2 expanders at plural levels, wherein each of the expanders is coupled to zero or more storage
3 devices.

1 11. The system of claim 10, wherein at least some of the expanders are coupled to
2 one or more storage devices.

1 12. The system of claim 11, wherein the controller in each of the two storage
2 subsystems is adapted to access the storage devices through one or more expanders.

1 13. A method for use in a system having plural storage subsystems, each storage
2 subsystem having a controller and an expander, the method comprising:
3 accessing, by the controller in a first one of the storage subsystems, a storage
4 device in the first storage subsystem through the expander in the first storage subsystem; and
5 communicating over an intercontroller link that connects the expander in the
6 first storage subsystem with an expander in a second one of the storage subsystems, wherein
7 the controller in the first storage subsystem communicates with the controller in the second
8 storage subsystem through the intercontroller link and the expanders in the first and second
9 storage subsystems.

1 14. The method of claim 13, wherein each of the expanders in the first and second
2 storage subsystems includes a SAS phy connected to the intercontroller link, the method
3 further comprising:

4 providing a routing table for the SAS phy in each of the first and second
5 storage subsystems; and

6 populating a plurality of entries in the routing table with routing information.

1 15. The method of claim 13, wherein each of the expanders in the first and second
2 storage subsystems includes one or more SAS phys connected to the intercontroller link and
3 one or more SAS phys connected to other components of the storage subsystem, the method
4 further comprising:

5 enabling the one or more SAS phys connected to other components of the
6 storage subsystems to be visible to normal SAS discovery software;

7 maintaining the one or more SAS phys connected to the intercontroller link not
8 visible to the SAS discovery software.

1 16. The method of claim 13, further comprising accessing, by the controller in the
2 second storage subsystem, a storage device in the second storage subsystem through the
3 expander in the second storage subsystem.

1 17. The method of claim 13, further comprising the controllers in the first and
2 second storage subsystems communicating with each other over the intercontroller link to
3 maintain cache coherency.

1 18. An expander in a first storage subsystem, comprising:

2 a first interface to couple to a storage device;

3 a second interface to couple to an intercontroller link to connect the expander
4 in the first storage subsystem with an expander in a second storage subsystem; and

5 a controller to communicate with another controller in the second storage
6 subsystem through the second interface and the intercontroller link.

1 19. The expander of claim 18, wherein each of the first and second interfaces
2 comprises one or more SAS phys.

1 20. The expander of claim 19, further comprising a storage to store a route table
2 associated with each SAS phy to couple to the intercontroller link, the route table containing
3 routing information associated with the second storage subsystem.

1 21. The expander of claim 20, further comprising an additional SAS phy to couple
2 to another expander in the first storage subsystem, the storage further to store a route table
3 associated with the additional SAS phy, wherein the route table for the SAS phy to couple to
4 the intercontroller link is programmed differently than the route table for the additional SAS
5 phy.

1 22. A system comprising:

2 plural storage subsystems, each storage subsystem having a means for
3 controlling access to storage devices, and expanding means for coupling to the storage
4 devices; and
5 means for interconnecting the expanding means in different storage
6 subsystems to enable the controlling means in one of the storage subsystems to communicate
7 with the controlling means in another one of the storage subsystems through the expanding
8 means and the interconnecting means.

1 23. The system of claim 22, wherein each of the expanding means has a SAS phy

2 to connect to the interconnecting means.